

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
25 March 2004 (25.03.2004)

PCT

(10) International Publication Number  
**WO 2004/024342 A1**

(51) International Patent Classification<sup>7</sup>: **B05C 17/005**,  
E04F 21/30

(21) International Application Number:  
PCT/AU2003/001183

(22) International Filing Date:  
10 September 2003 (10.09.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
2002951335 11 September 2002 (11.09.2002) AU

(71) Applicants and

(72) Inventors: **WILLERS, Andrew** [AU/AU]; 4 Rosedale  
Place, Helensvale, QLD 4212 (AU). **JEZUCHOWSKI,**  
**Friedhelm** [AU/AU]; 47 Mount Pleasant Road, Nunawad-  
ing, VIC 3131 (AU).

(74) Agent: **FREEHILLS CARTER SMITH BEADLE**;  
Level 43, 101 Collins Street, Melbourne, VIC 3000 (AU).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE,  
GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR,  
KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK,  
MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT,  
RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR,  
TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

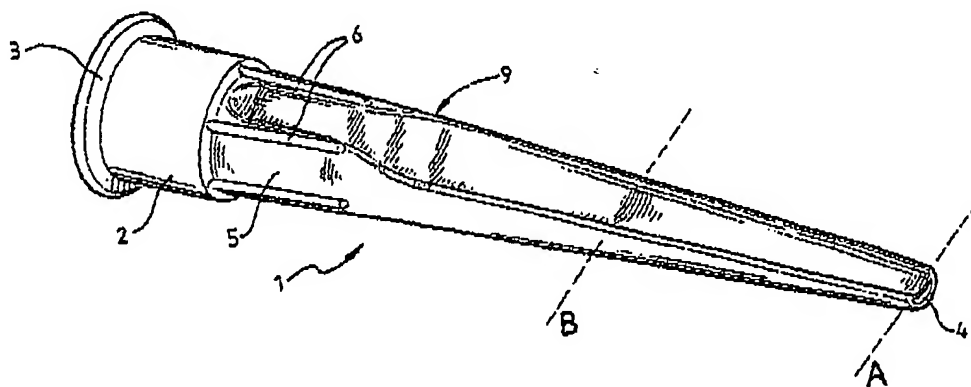
(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— with international search report

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: **NOZZLE FOR SEALANT CARTRIDGES**



(57) Abstract: This invention concerns a nozzle (1) for sealant cartridges that are typically used in caulking guns. The nozzle (1) includes an inlet end portion (2) that enables attachment of the nozzle (1) to a cartridge. The nozzle (1) has a tapered body (9) that terminates at an outlet (4). The tapered body (9) includes a cavity formed with a cross-sectional profile of triangle, arcuate or a crescent shape. Such profile produces a correspondingly shaped bead that permits less skilled working of the bead to achieve the desired chamfer or bevel on the sealant.

WO 2004/024342 A1

## NOZZLE FOR SEALANT CARTRIDGES

### Technical Field

This invention relates to nozzles for sealant cartridges.

### Background to the Invention

5 Sealants and fillers are widely used to form a body of material that can fill gaps or cracks or form material between two abutting surfaces. An example of such use is in the glazing of a domestic glass window pane in a window frame. A perimeter bead of sealant is first applied to the frame and a further bead is applied after the glass plane has been fitted to the frame. The further bead is applied  
10 around the circumference of the pane where the glass pane abuts the frame. The bead of sealant is then worked and shaped with a putty knife or similar tool to form a chamfered or bevelled surface of sealant. The sealant is flowable for application or forming purposes but becomes relatively non flowable by chemical cross-linking reactions or loss of solvent. After curing or drying the sealant may, if desired, be  
15 painted. Sealants can also be used as fillers to be used in surface preparation for subsequent painting.

Sealants can have a wide range of compositions including the well known classes of silicones, polysulfides and polyurethanes as well as acrylics.

Conventionally the sealants are applied from a storage cartridge which fits  
20 into a caulking gun. The cartridges are cylindrical shaped and typically have capacity of approximately 400 ml.

The outlet of the cartridge is typically male threaded. In use, a conventional nozzle is screw attached to the cartridge outlet after the outlet has been opened, usually by cutting the sealed tip off the outlet. The conventional nozzle has a  
25 frustoconical shape tapering inwards towards the tip of the nozzle. The nozzle may be cut at a selected point to obtain the desired bead diameter size. The nozzle may be also cut obliquely to assist the application of the bead to the working area.

In practice the working of the bead formed from conventional nozzles  
30 requires a reasonable amount of skill and experience to obtain the desired chamfered surface.

It is an object of the invention to provide an improved cartridge nozzle. Advantageously, the improved nozzle allows a chamfered surface to be obtained with inexperienced or DIY operators or more efficiently with experienced tradesmen.

## 5 Summary of the Invention

This invention provides in one form a nozzle for a sealant cartridge, the nozzle having a threaded inlet end portion for attachment to an outlet of a sealant cartridge and a body portion that extends away from the inlet end portion, the body portion having a cavity which tapers inwardly from the inlet end portion towards a  
10 nozzle outlet, the cavity being characterised in that the cross-sectional profile of the nozzle outlet is triangular, semi-circular or crescent shaped so as to produce a correspondingly shaped bead.

Preferably the cavity has a shape corresponding to the shape of the nozzle outlet. In one embodiment, the cross-sectional profile has the same general shape  
15 at positions from the nozzle outlet to at least 50% of the length of the nozzle measured from the nozzle outlet to the shoulder portion.

In a preferred form of the invention, the shape of the nozzle outlet and at least a part of the cavity are crescent shaped. In another embodiment, the outlet shape is arcuate, with one side comprising a parabolic, elliptical or irregular arc  
20 and the other side being a substantially straight line.

The invention will be further described with reference to preferred embodiments illustrated in the accompanying drawings.

## Brief Description of the Drawings

Figure 1 is a perspective view of a cartridge nozzle in accordance with an  
25 embodiment of the invention;

Figure 2 is a cross-sectional profile of the cavity at position A in Figure 1;

Figure 3 is a cross-sectional profile of the cavity at position B in Figure 1;

Figures 4(a) and (b) are an alternative profile at positions A and B of a second embodiment of the invention; and

Figures 5(a) and 5(b) are an alternative profile at positions A and B of a third embodiment of the invention.

### Detailed Description of the Preferred Embodiment

Referring to Figure 1, the nozzle 1 includes an inlet end portion 2 which has an annular flange 3 and an internally (female) threaded portion. The nozzle 1 has a shoulder portion 5 with longitudinal rib members 6 that assist in providing grip for attaching and detaching the nozzle 1 from a cartridge. The shoulder portion 5 is attached to the end inlet portion 2 opposite the flange 3 and may taper inwardly away from the inlet end portion 2. The nozzle 1 has a body portion 9 extending longitudinally away from the shoulder portion 5 and inlet end portion 2, which tapers inwardly generally from the end of the shoulder portion 5 towards a nozzle outlet 4. The cross-section profile of the body portion 9 at the outlet 4 (position A) and a central position B is shown in Figures 2 and 3 respectively where the profile at position A in Figure 1 is shown as 7 and the profile at position B in Figure 1 is shown as 8.

The profile of the cavity defined by the walls at position A (Figure 2) is the same shape (but different size) to the profile at the mid point of the body portion 9 between the nozzle outlet 4 and the start of the shoulder portion 5. In each case, the profiles 7 and 8 comprise intersecting circular arcs 10 and 11.

In this embodiment, the relative shape of the arcs 10 and 11, is defined by a predetermined ratio of arc 10, 11 diameters. Preferably, the smaller diameter arc 10 forms a semi-circle and the larger diameter arc 11 has a diameter approximately 20% greater than the diameter of the smaller diameter arc 10, i.e. a ratio of 1:1.2.

In use, the nozzle of the present invention is attached to a conventional sealant cartridge and the sealant is forced from the cartridge to the nozzle outlet 4 by a conventional caulking gun. The cross-sectional profile of the bead of sealant formed differs from the generally circular profile of sealant from a conventional nozzle. The shape of the sealant bead from the nozzle of the present invention corresponds to the shape of the cavity of the body portion 9 and, accordingly, allows less skilled working of the bead to achieve the desired chamfer or bevel. In some cases no further working is required thus saving time. By having the cavity

cross-sectional profile constant in shape but not size it is possible to adjust the size of the bead by cutting or trimming the body portion of the nozzle. Normally a cut would not be made to leave less than 50% of the nozzle.

In this specification the term crescent profile shape means the curved  
5 shape formed by two intersecting curves as exemplified by the waxing crescent moon. The term is not confined to shapes formed by intersecting circular arcs, as shown in Figures 1-3, but also includes other curved shapes including ellipses, parabolas and irregular curves, including combinations of different shapes. The preferred crescent profile is defined by circular arcs. It will be appreciated that the  
10 term crescent also includes shapes that approximate a crescent. For example the ends of a crescent could have a radius and this would be often the case when the nozzle is injection moulded. It will also be appreciated that it is the cross-sectional profile of the outlet of the cavity that determines the shape of the bead. However, in most cases with uniform wall thickness the outer shape of the body portion 9 of  
15 the nozzle 1 will be similar in profile to that of the cavity. However, this is not necessary and the outer shape of the body portion 9 may have a different profile.

Figures 4(a) and (b) show an alternative cross-section profile of a nozzle at positions equivalent to positions A and B respectively in Figure 1. In the case of Figure 4, the profile is arcuate with one side being a straight line. This corresponds  
20 to a flat surface with the bead exits the nozzle outlet on application.

Similarly Figures 5(a) and (b) show an alternative triangular profile of a nozzle at positions equivalent to positions A and B respectively in Figure 1. Such a profile also results in a bead with a flat surface.

The nozzles 1 of the present invention may be conveniently manufactured  
25 in polyethylene or other thermoplastic polymers by injection moulding. A cap for the nozzle may be integrally moulded with the nozzle. In use the cap is first detached from the nozzle. The wall thickness of the nozzle is similar to that of a conventional nozzle and can be, for example, 1mm.

Those skilled in the art will appreciate that the invention described herein is  
30 susceptible to variations and modifications other than those specifically described.

It will be understood that the present invention encompasses all such variations and modifications that fall within the spirit and scope.

**CLAIMS**

1. A nozzle for a sealant cartridge, the nozzle having a threaded inlet end portion for attachment to an outlet of a sealant cartridge and a body portion that extends away from the inlet end portion, the body portion having a cavity which  
5 tapers inwardly from the inlet end portion towards a nozzle outlet, the cavity being characterised in that the cross-sectional profile of the nozzle outlet of the body portion is triangular, arcuate or crescent shaped so as to produce a correspondingly shaped bead.
2. A nozzle according to claim 1, wherein the nozzle outlet shape is a crescent  
10 and crescent shape comprises intersecting parabolic, elliptical or irregular arcs.
3. A nozzle according to claim 1, wherein the nozzle outlet shape is a crescent and the crescent shape comprises intersecting circular arcs.
4. A nozzle according to claim 3, wherein the arc shapes are defined according to a predetermined ratio of diameters.
- 15 5. A nozzle according to claim 4, wherein the ratio is 1:1.2.
6. A nozzle according to any one of claims 4 or 5, wherein the arc having a relatively smaller diameter forms a semi-circle.
7. A nozzle of claim 1, wherein the nozzle outlet shape is arcuate with one side comprising a parabolic, elliptical or irregular arc and the other side being a  
20 straight line.
8. A nozzle of claim 1, wherein the nozzle outlet shape is substantially triangular.
9. A nozzle according to any preceding claim, wherein the cavity has a shape corresponding to the shape of the nozzle outlet.
- 25 10. A nozzle according to any preceding claim, wherein the nozzle has a shoulder portion intermediate the inlet end portion and body portion, said shoulder

portion including ribs to assist a user to grip the nozzle during attachment to and detachment from a cartridge.

11. A nozzle according to any preceding claim, wherein the cavity has a generally uniform crescent profile, of differing size according to the taper, from the nozzle outlet to at least a mid-point of the body portion away from the nozzle outlet.
- 5



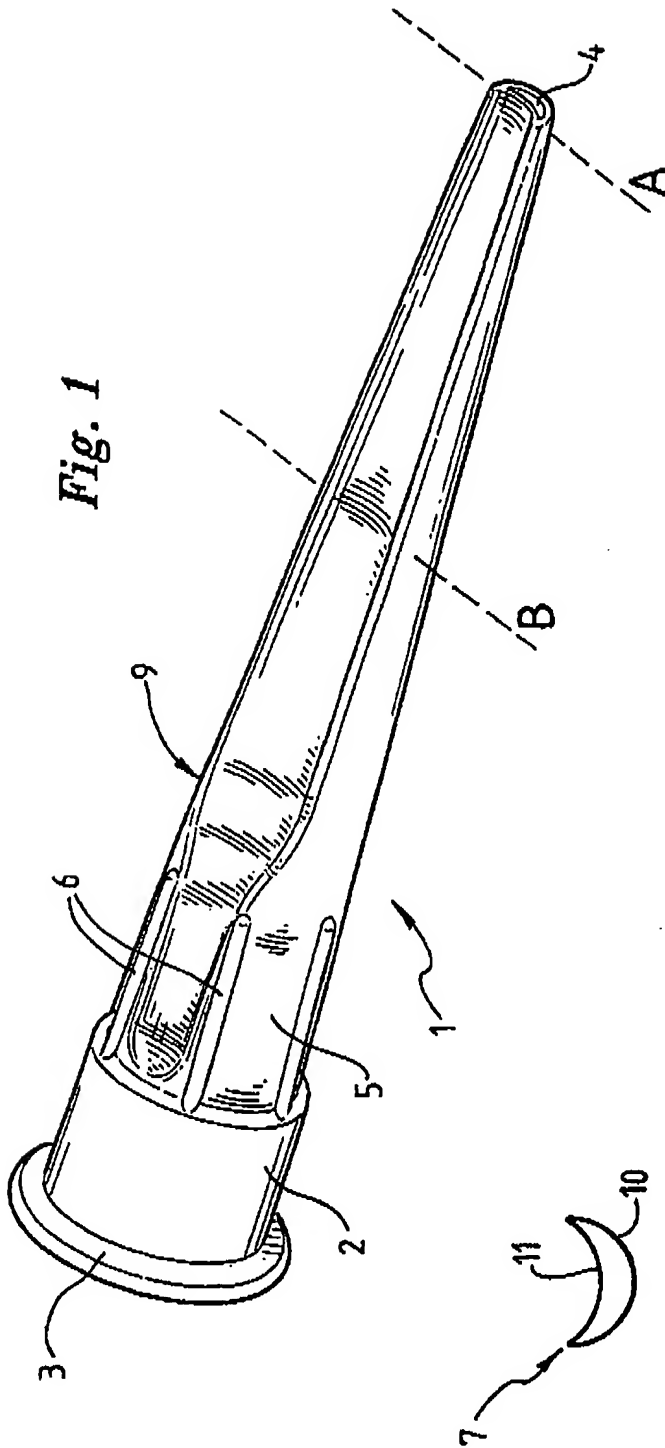


Fig. 1



Fig. 4(a)



Fig. 5(a)



Fig. 5(b)



Fig. 4(b)



Fig. 2



Fig. 3

Rec'd PCT/PTO 11 MAR 2005

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU03/01183

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int. Cl. <sup>7</sup> : B05C 17/005, E04F 21/30		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols)		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) DWPI IPC B05B 1/-, 11/-, B05C 1/-, 11/-, 17/-, B65D 25/-, 83/76, E04F 21/30 & keywords: nozzle, spout, profile, cross section, shape, curve, arc, crescent, semicircular, circular, elliptical, parabolic, triangular, concentric, seal, filler, mastic, caulk, putty, adhesive, paste, bead, seam and similar terms.		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	Derwent Abstract Accession No. 98-088391/09, Class P42, DE 29719428 U1 (KÜHN) 22 January 1998 Abstract	1, 8-10
X	US 5249876 A (HATTMAN) 5 October 1993 See whole document.	1, 8-10
X	US 4981629 A (COOK) 1 January 1991 See whole document, particularly figure 3.	1, 8-10
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
<p>* Special categories of cited documents.</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p>		
Date of the actual completion of the international search 5 November 2003		Date of mailing of the international search report 12 NOV 2003
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929		Authorized officer  DEREK BUTLER Telephone No. : (02) 6283 2347

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/AU03/01183

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2276365 A (PRESTELE) 28 September 1994 See whole document, particularly figures 2 & 4.	1, 9, 7

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/AU03/01183

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member	
DE	29719428	NIL	
US	5249876	NIL	
US	4981629	US	5033951
GB	2276365	FR	2705088
END OF ANNEX			